

48 Wash Your Hands, Please!



In the 1840s, Dr. Semmelweis found that hand washing could significantly reduce the rate of infection in hospitals. One common type of illness that can be reduced by hand washing is food poisoning. Millions of people suffer from some form of food poisoning each year. Most people who get these infections don't die, but they feel terrible and miss work or school days.

Could hand washing reduce the number of times you get sick? Hands have about 200 million microbes on them. Most are harmless, but some of these microbes can cause food poisoning, colds, flu, and other infections. In fact, public health researchers estimate that 80% of common infections in the U.S. are caught by touching surfaces that are contaminated with infectious microbes. Contaminated surfaces might include sinks, countertops, doorknobs, or your own hands.



CHALLENGE



How effectively does hand washing reduce the spread of microbes? How can you improve the effectiveness of hand washing?

MATERIALS



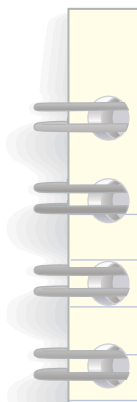
For the class

- 2 large ultraviolet (UV) lights with batteries
- Glo Germ™ powder
- soap
- paper towels
- water

PROCEDURE

Part A: Washing Your Hands

1. When, where, and why do you wash your hands? Talk this over with your group of four, and record your ideas in your science notebook.
2. In your science notebook, make a table like the one shown below.



Observation of Hands		
	Hands sprinkled with powder	Hands that were shaken
Before		
After		

3. Have one person on your team of two students sprinkle a small amount of white powder on the palm of one hand. This person should spread the powder all over his or her hands by rubbing the hands together, covering the palms, backs of hands, fingers, and nails.
4. Firmly shake both hands with your partner. Do this by shaking right hand with right hand and left hand with left hand.
5. Look carefully at your hands and your partner's hands under the ultra-violet (UV) light. Record your observations in the first row of your data table.
6. Both you and your partner should wash your hands as you would *normally*.
7. Look carefully at your hands and your partner's hands under the UV light. Record your observations in your data table.

Part B: Improving Hand Washing

8. Design an experiment to improve the effectiveness of hand washing in removing microbes from the surface of your hands. For example, does the length of time you rub your hands make a difference? Is there a specific technique that is better for hand washing?

When designing your experiment, think about the following questions:

- What is the purpose of your experiment?
 - What variable are you testing?
 - What variables will you keep the same?
 - What is your hypothesis?
 - How many trials will you conduct?
 - Will you collect qualitative and/or quantitative data? How will these data help you make a conclusion?
 - How will you record these data?
9. Record your hypothesis and your planned experimental procedure in your science notebook.
10. Make a data table that has space for all the data you need to record. You will fill it in during your experiment.
11. Obtain your teacher's approval of your experiment.
12. Conduct your experiment and record your results.

ANALYSIS

Part A: Washing Your Hands



1. Where on your hands did you find the most “microbes” (white powder)?



2. Based on your results in Part A, how well did washing your hands remove “microbes”?

3. Look again at your answers to the questions, “When, where, and why do you wash your hands?” from Procedure Step 1. Have any of your ideas changed?



4. Why is hand washing important? Use your knowledge of microbes and the results of this activity to explain your answer.

.Part B: Improving Hand Washing

5. How well do powdered “microbes” model real microbes? Explain.
6. Imagine that your school has decided to launch a hand-washing campaign. You are in charge of designing the campaign and evaluating its effectiveness.
 - a. Why might people resist changing the frequency and the way in which they wash their hands?
 - b. Explain how you could persuade people to change their hand-washing behavior.
 - c. What type of data could you collect (both before and after the campaign) to determine if the hand-washing campaign was effective?
7. Read the recommendations for hand washing for surgeons and food handlers below and on the next page. Why do both sets of guidelines stress rubbing or scrubbing the hands?
8. Make a list of recommendations for a school hand-washing campaign. Explain how each recommendation would help reduce the spread of microbes.

Guidelines for Doctors Prior to Surgery

- Wet hands.
- Clean nails.
- Scrub hands (fronts and backs, each finger and between fingers) and forearms for 5 minutes, using antibacterial soap and a hand brush.
- Hold hands above elbow and allow excess water to drip off.
- Dry hands and forearms with a sterile towel.
- Put on surgical gown.
- Put on sterile gloves. (Many surgeons use double gloves.)

Guidelines for Food Industry Workers

(restaurant staff, supermarket workers, food packers, etc.)

- All personnel must wash their hands before returning to work.
- Wet hands with warm running water.
- Add soap, then rub hands together, making a soapy lather. Do this away from the running water for at least 15 seconds, being careful not to wash the lather away.
- Wash the front and back of hands, as well as between fingers and under nails.
- Rinse hands well under warm running water. Let the water run back into the sink, not down to your elbows.
- Turn off the water with a paper towel and dispose in a proper receptacle.
- Dry hands thoroughly with a clean towel.